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BIBLIOGRAPHY OF THE CODLING MOTH, 1935

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CONTENTS

INTRODUCTION

In connection with the work of the Division of Fruit Insect Investigations an effort is being made to review and abstract the voluminous current literature relating to the codling moth problem. The list of references given below includes those that appeared during the calendar year 1935 as far as they have come to the attention of the Division. A brief abstract is given with each article, indicating the general nature of the contents. Much of this information on the foreign literature has been taken from the abstracts which appeared in the Review of Applied Entomology. In such cases reference is made to the volume and page number of the review where the abstract may be found. In a few instances titles that were lacking have been supplied by the reviewer to indicate the general nature of the article. Supplied titles are in brackets.

Included in this list are a considerable number of references to experimental data which prior to 1935 appeared in the pools of information on the codling moth that were prepared and circulated by the Bureau of Entomology and Plant Quarantine at the request of the Committee on Codling Moth of the American Association of Economic Entomologists.

It is realized that this bibliography is probably incomplete. The Division of Fruit Insect Investigations would appreciate having called to its attention any references that have been overlooked. These will be included in bibliographies which may be prepared later.

The anonymous publications follow those listed alphabetically by authors.

AMERICAN REFERENCES

Allen, H. W.
1935. Planes useful to agriculture. Natl. Repub. 22 (11): 12.
Shipping parasites by air; codling moth parasites sent to Pacific Coast stations in 24 hours, with low mortality.

Barrett, R. E.
1935. A statistical method of determining the efficiency of banding for codling moth, with eight years' results. Jour. Econ. Ent. 28: 701-704.
Statistical study of efficiency of bands. In walnuts. If "annual build-up factor" is known, efficiency required for control can be computed. Equations are given. Build-up factor was from 1.22 to 6.46; in years 1927-33 percentage control by bands was 5.3 in old orchards and 22.4 in young.

Borden, A. D.
1935. [Codling moth.] Calif. Dept. Agr. Monthly Bul. 24: 267. (In Calif. Ent. Club Proc.)
Experiments with sprays in several places noted. Substitutes for lead arsenate not very satisfactory. Early emergence in 1934 in California.

Borden, A. D.
1935. Codling moth control and spray residue studies in California. Jour. Econ. Ent. 28: 951-956.
Residue studied on pear and apple in northern California; seasonal history and spray program discussed. Lead arsenate essential in early sprays; spreader desirable from cleaning standpoint. Build-up of deposit, loss, and growth in area discussed. Cold water and acid wash best for cleaning.

Borden, A. D.
1935. Codling moth control in 1934. Pacific Rural Press 129: 201.
Peak of emergence early in April; some emergence in mid-April and mid-May. Second brood peak in mid-July and mid-August. Heavier and more thorough spraying advised. Discussion of experiments on sprays and residue. No substitute yet for lead arsenate.

Borden, A. D.
1935. Band now for codling moth worms. Pacific Rural Press 129: 593.
Instructions for banding (June).

Bourne, A. I.
1935. Codling moth, plum curculio and apple maggot. Amer. Pomol. Soc. Proc. 51: 201.
Survey of control methods and habits.

Bourne, A. I.
1935. Codling moth, plum curculio and apple maggot. Conn. Pomol. Soc. Proc. 45: 225.
(Same as Bourne's article in American Pomological Society Proceedings.)

Bourne, A. I., and Whitcomb, W. D.
1935. Entomology. Mass. Agr. Expt. Bul. 315: 38-52. (Mass. Agr. Expt. Sta. Ann. Rept. 1934.)
Lead arsenate gave control. Light traps against adults seem promising.

Boyce, A. M.
1935. The codling moth in Persian walnuts. Jour. Econ. Ent. 28: 864-873.
In walnuts. History. First noted in California in 1873; in walnuts in 1909. Became serious in southern California in 1918. Out-state and foreign records cited; a resume of the whole problem, with bibliography. Walnut form may be physiologically different from apple form. Walnut resists entry more than apple. Varieties differ in susceptibility.
Heaviest emergence in May; two or three generations; larval period about 40 days. Control by spray of basic lead arsenate (acid lead arsenate injures tree). One spray is enough except when late brood becomes numerous. Lead arsenate substitutes or dusts unsatisfactory. Spray application problems and banding discussed.

Boyce, A. M.
1935. The codling moth in walnuts. Pacific Rural Press 129: 191, 199.
Summary of situation.
Notes on habits. When 3 or 4 percent of crop is infested, control should be applied to next crop. Spray of basic lead arsenate is standard control; dust may suffice in light infestations. Bait pans aid timing. Bands may have some value.

Boyce, A. M., and Braucher, O. L.
1935. Control the codling moth. Diamond Walnut News 17 (2): 16-17.
Walnut spraying methods and control problem in California much as noted elsewhere. Special tower for high trees shown in illustrations. One or two sprays of basic lead arsenate sufficient. When 2 or 3 percent of nuts show infestation, population warrants control to head off future trouble.

Brazelton, J. S.
1935. U. S. enters codling moth fight. Kans. Farm. 73 (1): 15.
Same material as in Mo. Ruralist.

Brazelton, J. S.
1935. Codling moth stands more dope. Kans. Farm. 73 (9): 7.
Notes on apparent resistance of codling moth to poison. Humorous comment on a state and a commercial entomologist in same town in northeast Kansas.

Brazelton, J. S.
1935. U. S. enters codling moth fight. Mo. Rur. 76 (1): 9.
Use of relief funds in orchard sanitation.

Brittain, W. H.
1935. The codling moth and its control. Rept. Pomol and Fruit Growing Soc. Quebec 41: 45-50.
Control. Notes on habits; years 1930-34 were favorable, building up large populations. Calyx spray and three others recommended. It is expected that Quebec's codling moth problem can easily be solved.

Brittain, W. H.
1935. The codling moth and its control. Jour. Agr. and Hort. 38 (11): 11, 31, 43.
Light crop and favorable season led to high percentage of infestation in Quebec in 1934. Control noted; four sprays advised. Supplementary measures usually not needed in Quebec.

Britton, W. E.
1935. Connecticut State Entomologist, thirty-fourth report, 1934. Conn. Agr. Expt. Sta. Bull. 368.
Cryolite unsatisfactory in 1934.

Burkholder, C. L.
1935. Residue loads resulting from first and second brood sprays. Ind. Hort. Soc. Trans. 74: 45-49.
Spraying residue will not be serious if only three or four sprays are used; if more sprays are used, fruit must be cleaned. Oil in spray increases residue.

Burkholder, C. L.
1935. Can we control a moderate codling moth infestation by heavy first brood spraying only? Hoosier Hort. 17: 38-41.
Summer sprays result in large residues if more than three are applied. Oil increases residue if used with lead arsenate. Good test of thorough early spraying urged.

Burr, W. W.
1935. Fruits and vegetables. Nebr. Agr. Expt. Sta. Ann. Rept. 48: 14.
Drought and heat interfered with control experiments; nicotine-oil compared well with lead arsenate.

Burr, W. W.
1935. Insects, rodents and birds. Nebr. Agr. Expt. Sta. Ann. Rept. 48: 18.
Seasonal-history studies carried on in 1934. Drought and heat had marked effects.

Chapman, P. J.
1935. The codling moth control problem in districts infested with apple maggot. Jour. Econ. Ent. 28: 184-187.
Control problem in eastern New York; codling moth is associated with apple maggot, and both must be provided for. Has not increased here of late years as in other sections. Nicotine and calcium arsenate are of interest but inferior to lead arsenate.

Childs, L.
1935. Substitutes for lead arsenate in codling moth control in the Hood River Valley. Better Fruit 29 (8): 5-6.
Substitutes for lead arsenate; zinc and calcium arsenates show some promise but are inferior to lead arsenate; fluorides are not satisfactory; oils cause complications. Nicotine-bentonite is most promising organic material.

Clausen, C. P.
1935. The control of insect pests by parasites and predators. Blue Anchor 12 (8): 4-6, 21-22.
Among pests noted is codling moth. Ascogaster carpocapsae, present in Northeastern States is being introduced in other sections.

Cleveland, C. R.
1935. 1934 Experiments with newly developed types of oils for codling moth control. Jour. Econ. Ent. 28: 715-726.
Oil Sprays. New summer oils developed and tested. They are easy to use and show promise; are effective when combined with lead arsenate. Cleaning of residue is necessary.

Collins, D. L.
1935. Iris-pigment migration and its relation to behavior in the codling moth. Jour. Expt. Zool. 69: 165-197.
Behavior with regard to eye condition (dark-adapted, light-adapted, or changing). Much the same as abstracted elsewhere.

Collins, D. L., and Machado, W.
1935. Comments upon phototropism in the codling moth with reference to the physiology of the compound eyes. Jour. Econ. Ent. 28: 103-106.
Light responses and eye physiology in adults. Adults are positively phototropic only when eyes are "dark-adapted." Adults are active when eye pigment is migrating, at rest when completely dark- or light-adapted.

Cory, E. N.
1935. Codling moth situation. Peninsula Hort. Soc. Trans. 49: 35.
In Maryland, in 1935, cool spring handicapped codling moth. In western Maryland 87.1 percent worm-free fruit. In central Maryland 82.7 percent worm-free. Eastern Shore, 91.2 percent uninjured in one group, 49.6 percent in another. General State average 80.5 percent. (Worm-free means uninjured here.) Codling moth should be controlled while at a low ebb, to prevent rise.

Courtney, W. B.
1935. [Losses from codling moth.] Collier's 95 (16): 55.

Cox, J. A., and Daniel, D. M.
1935. Ascogaster carpocapsae Viereck in relation to arsenical sprays. Jour. Econ. Ent. 28: 113-120.
Parasitization by Ascogaster more than twice as great in unsprayed as in sprayed orchards. Lives of adult parasites shortened by poison on foliage in cages.

Crosby, C. R., and Mills, W. D.
1935. Protecting orchard crops from diseases and insects in the Hudson Valley. N. Y. (Cornell) Ext. Bull. 314: 32, 56.
Outline of biology and control, much as in Cornell Extension Bulletin 313.

Crosby, C. R., Mills, W. D., and Blauvelt, W. E.
1935. Protecting orchard crops from diseases and insects in western New York. N. Y. (Cornell) Ext. Bull. 313: 33, 55.
Codling moth the worst New York apple pest. Outline of biology. Spring emergence lasts 6 or 7 weeks.
From three sprays to five or six necessary. Use of oil with lead arsenate increases its efficiency (and residue). Oil cannot be used with or shortly after sulphur fungicide. Oil-nicotine is good for later sprays on early varieties. Chemical bands help in control. Calcium arsenate is less effective than lead arsenate, but will serve in light infestations and lessen residue problem.
Also a pest of pear; fewer "side worms" than with apple.

Cutright, C. R.
1935. The codling moth. Ohio Agr. Expt. Sta. Bull. 548: 39-40. (53rd Rept. Ohio Agr. Expt. Sta.)
Warm, dry weather of 1934 was favorable; development was early and season long. At harvest time 11 percent of population was caught in bands. Varieties differ in susceptibility. Nicotine tannate with bentonite, and oil-nicotine, give fair results with frequent application; calcium arsenate shows promise; all substitutes are inferior to lead arsenate.

Cutright, C. R.
1935. Packing house sanitation in codling moth control. Ohio Weekly Press Bull. 20: 7. April 25.
Packing-shed clean-up should be practiced.

Cutright, C. R.
1935. Research work with codling moth. Ohio State Hort. Soc. Proc. 68: 35-41.
Review of research problem and recent advances. Lead arsenate still standard; other insecticides show promise, especially calcium and manganese arsenates.

Cutright, C. R., and Morrison, H. E.
1935. Varietal susceptibility to codling moth injury. Jour. Econ. Ent. 28: 107-109.
Varietal susceptibility. Some susceptible varieties seem to be (1) above average size, (2) high in "boquet", (3) tender-skinned, (4) sweet, (5) some are midseason. It seems doubtful whether all susceptible varieties can be classified by a few criteria.

Davis, J. J.
1935. Division of Entomology. Ind. Ext. Rept. 24: 56.
Late in 1934 too hot and dry for codling moth; however, it carried over in considerable numbers in spite of conditions and caused anxiety.

Davis, J. J.
1935. Insects of Indiana for 1934. Ind. Acad. Sci. Proc. 44: 203.
Early and long season; a partial fourth generation in southern Indiana, a partial third in northern Indiana. Dry heat checked but did not reduce species late in summer.

Davis, J. J.
1935. The significance of supplementary controls in combating the codling moth. Ind. Hort. Soc. Trans. 74: 72-82.
Thinning, ground clean-up, early crop removal, screening packing sheds, chemical bands, traps, and other supplementary controls discussed.

Davis, J. J.
1935. Progress in codling moth research. Hoosier Hort. 16: 131-135.
Work in progress outlined; shed screening, orchard clean-up, banding, traps, spraying, timing sprays.

Davis, J. J.
1935. The significance of supplementary controls in combatting the codling moth. Hoosier Hort. 17: 27-32, 43-48.
Supplementary control outlined; much as abstracted elsewhere.

Davis, J. J.
1935. Second brood codling moth control. Hoosier Hort. 17: 99-100.
Second-brood spray will result in need of residue cleaning, but should be applied.

Driggers, B. F., and Pepper, E. B.
1935. Further experiments with fixed nicotine compounds in codling moth control. Jour. Econ. Ent. 28: 162-171.
Control experiments in southern New Jersey. Some of the nicotine mixtures compared well with lead arsenate in effectiveness and injured the trees less.

Eyer, J. R.
1935. Further observations on the attractiveness of esters of the ethyl acetate series to the codling moth. Jour. Econ. Ent. 28: 940-942.
Discussion of baits and of the two esters of the ethyl acetate series that are most attractive.

Farnsworth, F.
1935. Growers' experiences with codling moth control. Ohio State Hort. Soc. Proc. 68: 34.
Growers' experiences, Waterville, Ohio. Thorough and heavy spraying, and clean-up, are gaining ground against hard problem. Increase in infestation, 1929 to 1931, from 10 to 35 percent; better methods in 1932 reduced infestation to 10 percent; in 1933, light crop, 35 percent again; in 1934, again reduced.

Farrar, M. D., and McGovran, E. R.
1935. [Rearing technique.] Ill. State Acad. Sci. Trans. 28: 245-247.
Rearing methods for laboratory tests. Life cycle outlined. Hibernating larvae put in cold storage, brought out when needed; adults 3 or 4 weeks later. Technique of caging, securing oviposition, incubation, and entrance of larvae outlined.

Fitzgerald, O. A.
1935. West. Farm Life 37 (7): 7.
Not seen. On parasites (bibliographer).

Flint, W. P., et al.
1935. Progress in control of codling moth in 1934. Ill. Hort. Soc. Trans. 68: 153-176.
Situation discussed. Codling moth infestation in state in 1931, 1932, 1933, and 1934 was 8.7, 13.5, 15.7, 11.4 percent, respectively. In northern part it increased in 1934 (long warm season); elsewhere heat hit codling moth.
Lead arsenate-summer oil made best spray. "Kutano" good but injured leaves. Many other details. Soybean oil is promising but caused some injury in one case. Cryolite shows promise. Notes on bands, bait and light traps, box clean-up

Flint, W. P.
1935. Codling moth control in southern Illinois in 1934. Ill. Hort. Soc. Trans. 68: 460-468.
In southern Illinois in 1934; very heavy infestation at start, checked by hot dry weather; a reduction. Infestation, 1930 to 1934, was 18.4, 12.7, 16.3, 20.6, and 10.9 percent, respectively. Notes on control tests.
Use of oil with lead has been effective. Old and young trees, counties, materials, and spray dates compared. With fall apples, lead arsenate and later washing must be used. With summer apples lead arsenate in calyx spray and nicotine in cover sprays are successful.

Flint, W. P.
1935. Controlling codling moth at its worst. Amer. Fruit Grower 55: 2, 8, 18-19.
A stringent clean-up, a schedule of eight or more lead arsenate sprays, with later residue washing, is needed.

Fluke, C. L.
1935. Pointers for codling moth control. Wis. Hort. 25: 211.
Timing sprays, bands, bait traps; popular account, urging current procedure. See Wis. Hort. 25 (10): 235.

Fluke, C. L.
1935. Codling moth bands and hooch traps. Wis. Hort. 25 (10): 235-236.
Bands and traps, popular account. Instructions for use of chemical bands, and for use of bait traps to determine spray dates.

Fluke, C. L.
1935. The 1935 insect situation. Wis. Hort. 25: 259.
In Wisconsin in 1935. Cool spring delayed activity. Weathering of late sprays can be hastened by adding sodium silicate.

Frazier, F. A.
1935. Codling moth control and spray residue removal. Better Fruit 29: 12. Aug. 9.
Describes an improved tank-mixing method for use of summer oil with lead arsenate.

Frazier, F. A.
1935. Codling moth control and spray residue removal. Northw. Fr. Grow. 7 (5): 5.
Notes on use of oil in arsenical sprays, featuring an emulsifier made by the author.

Garcia, F.
1935. Biology. New Mex. Agr. Expt. Sta. Rept. 46 (1934-35): 27-29.
Baits and lights reduced population, but are not recommended for use commercially. Cane sirup and ethyl-oxhydrate were best baits; mercury lamp with high percent of bluish end of spectrum was best light. Nicotine with bentonite-sulphur in late sprays is promising.

Garcia, R.
1935. Palomilla de la fruta. Agr. Mex. 51 (8): 36-38.
Brief general account of habits and control, in Spanish. Occurs in northern Mexico.

Gardner, V. R.
1935. Codling moth. Mich. Hort. Soc. Rept. 65: 17-18 (in article on experiment station responsibilities).
Bad situation for last 5 years; more thorough spraying is answer. Notes on residue problem and role of experiment station.

Gould, E.
1935. Newer methods and materials for controlling codling moth. Md. State Hort. Soc. Proc. 67: 41-45.
Situation outlined; favorable weather, increase of codling moth, residue restrictions. Lead arsenate sprays with later washing still the best; banding, packing-shed clean-up, etc., should supplement.

Gould, E.
1935. Better control of the codling moth. Mountaineer Grower 6 (59): 9-13.
Problem is serious. Faulty spraying is most to blame. Chemical bands and packing-shed clean-up are also important.

Graham, C.
1935. Preparation and use of chemically treated bands for codling moth control. Md. Fruit Grower 5 (5): 6-7.
Chemical bands; instructions for use.

Graham, C.
1935. Seasonal activities of codling moth at Hancock, Md., 1935., Md. Fruit Grower 5 (7): 8.
Seasonal activities in 1935 at Hancock, Md., retarded by coolness; first moths May 24. Probably no third brood this year.

Hansberry, T. R., and Richardson, C. H.
1935. A design for testing technique in codling moth spray experiments. Iowa State Coll. Jour. Sci. 10: 27-35.
Design of experiment for later analysis. Latin square, four treatments, 16 plots, 6 trees per plot. On 3 trees per plot all crop was counted, by lots of 10 apples each. For sample, 300 fruits per tree selected -- 30 lots of 10 each, consecutive. In another analysis, 30 lots of 10 each at random. In a third analysis, entire percentage per tree only.
Random selection of 300 apples in 30 lots of 10 each gave a good picture of tree infestation.
Negative correlation between crop size and percentage infested in single trees; correlation much less by 12-tree groups.

Hansberry, T. R., and Richardson, C. H.
1935. [Baits.] Iowa Hort. Soc. Trans. 70: 13-16.
Not seen. Bait records (bibliographer).

Harman, S. W.
1935. How we met the codling moth situation in western New York in 1934. Jour. Econ. Ent. 28: 187-189.
In western New York in 1934. Species has grown worse in Niagara vicinity in last 10 years. Heavy dosage of lead arsenate and use of oil in early sprays, with close attention to washing fruit, reduced injury considerably.

Harman, S. W., Reed, T. W., and Mack, G. L.
1935. The insecticidal efficiency of various nicotine compounds for control of the codling moth, 1934. Jour. Econ. Ent. 28: 109-112.
Nicotine compounds tested; did not compare well with lead arsenate in effectiveness and cheapness, but might be used in later sprays with good effect in some cases. Oil-nicotine and bentonite-nicotine were most promising.

Haseman, L.
1935. Entomology. Mo. Agr. Expt. Sta. Bull. 358: 62-67. (Rept. Mo. Agr. Expt. Sta. 1933-1934).
In 1934, four generations; midsummer heat injured moths. Adults in mid-May, end of June, end of July and September. Numerous investigations on spray materials reported. Zinc arsenate shows promise. Banding and winter clean-up proved value. Hibernating larvae: 1.9 percent on ground, 89.4 percent on trunk, 6.2 percent in crotches and big limbs, 2.5 percent on small limbs. Packing-shed control and bait and light traps investigated.

Haseman, L.
1935. Six notorious enemies of bumper crops. Mo. Fur. 76 (10): 3, 24.
Codling moth increased in recent years, but has a lighter population this year. Notes on spray schedule and clean-up.

Hawkins, F.
1935. [Codling moth control.] Ill. State Hort. Soc. Trans. 68: 487-489.
Sanitation and spray schedule (11 sprays) described by grower. "Practice the usual control methods in an unusual way."

Headlee, T. J.
1935. Research needs of codling moth control. Jour. Econ. Ent. 28: 172-176.
Needs in research. Summarizes important contributions to control, with bibliography. Needs: To fit practices to natural control, to reduce wintering population, kill adults, kill eggs (without injuring tree), and kill larvae (without injuring tree or leaving residue).
Winter clean-up offers best opportunity to reduce population; nicotine-bentonite praised.

Hedrick, U. P.
1935. Apple insects. N. Y. (Geneva) Agr. Expt. Sta. Rept. 53: 42-43 (for 1933-1934).
Codling moth has increased in importance in western New York. Tests of lead arsenate substitutes reported; none were very good, but nicotine-oil and calcium arsenate show promise. Studies of clean-up practices and residue washing reported.

Hedrick, U. P.
1935. Phototropic responses of the codling moth. N. Y. (Geneva) Agr. Expt. Sta. Rept. 53: 48-49 (for 1933-1934).
Light traps and responses studied. Of 9,000 moths, 43 percent were female. Benefit of light traps doubtful. Heavy winter killing of coding moth in 1933-1934.

Heider, H. F.
1935. Growers' experiences with codling moth control. Ohio State Hort. Soc. Proc. 68: 28-30.
Growers' experiences at Chesapeake, Ohio. Increasing control difficulty. With strong effort, loss reduced to 50 percent with fair crop; but bands show that population is reduced and hope is felt for further improvement.

Herbert, F.
1935. [Codling Moth.] Monthly Bull. Calif. Dept. Agr. 24: 267.
Considerable damage in 1934, especially to pears. Experiments with sprays; oil and nicotine show some promise. "Adverse publicity has hurt lead arsenate."

Herrick, G. W.
1935. Once more, the codling moth. Rural New Yorker 94: 66, 68.
Popular outline of life and seasonal history. Orchard and packing-shed clean-up, banding and spray recommendations discussed; three schedules for orchards of different grades of infestation. Washing off residue is necessary.

Hixson, E.
1935. Insect pest studies. Okla. Agr. Expt. Sta. Rept. 1932-1934: 256-259.
Among pests noted in 1933; checked by heat in 1934.

Hodgkiss, H. E.
1935. The codling moth situation in Pennsylvania. Jour. Econ. Ent. 28: 609-612.
Pennsylvania situation. In most places control is satisfactory if well carried out. In four counties (not named) codling moth is out of hand. Better clean-up and more spray applications are recommended for these. Notes on recommendations, percentage of growers following them, residue, etc. Lead arsenate, proper timing, and thoroughness are essential.

Hodgkiss, H. E.
1935. Old facts or new fancies. Pa. Hort. Assoc. News 12 (1): 69-75.
Control; recent changes. Banding, residue problem, and cleaning residue discussed. Cooperative observations allow good study of seasonal history. Spray recommendations; lead arsenate substitutes not satisfactory.

Hough, W. S.
1935. Codling moth control problem in the Shenandoah-Cumberland fruit region. Jour. Econ. Ent. 28: 614.
In Shenandoah-Cumberland region; brief summary of recommendations and practice.

Hough, W. S.
1935. Results of experiments with nonarsenicals for codling moth control. Trans. Peninsula Hort. Soc. 1934: 12-14.
Nicotine-oil and cryolite with oil showed promise as late summer sprays.

Houser, J. S., et al.
1935. Report of codling moth committee (of American Association of Economic Entomologists). Jour. Econ. Ent. 28: 8-9.
Chief activity has been to sponsor codling moth conference and arrange for distribution of mimeographed information.

Hutson, R.
1935. The more important apple insects of Michigan. Mich. Hort. Soc. Rept. 65: 35-36.
In 1935, less loss from codling moth than usual; late cool season. Timing sprays discussed. Fixed dates with modifications by experiment station seem best; traps may aid in timing.

Iddings, E. J.
1935. Entomology. Idaho Agr. Expt. Sta. Bull. 217: 28. (Agr. Expt. Sta. Rept. 1934.)
Hot-water sterilization of boxes; 190°-196° F. for 30 seconds, or 150°-152° F. for 60 seconds, was effective against cocooned larvae. Pyrethrum kills adults.

Isely, D., and Schwardt, H. H.
1935. Entomology. Ark. Agr. Expt. Sta. Bull. 323: 34-35. (47th Rept. Ark. Agr. Expt. Sta.)
Sprays gave fair results, 1934. Lead arsenate with oil, 3.4 percent wormy; without oil, 16.2 percent; eight sprays. Substitutes for lead arsenate were poor. Banding is a good supplement.

Johnson, E. C.
1935. Forward without lead in codling moth war. Northw. Fr. Grow. 7 (10); 4, 14.
History of problem in Washington. Calcium arsenate seems promising.

Keilholz, F. J.
1935. Entomology investigations. Ill. Agr. Expt. Sta. Rept. 1933-1934: 148-150.
Severe injury in Illinois. Table of results with different spray materials. Lead arsenate, with lime and oil, in the lead. Oil-nicotine substituted in late sprays with fair results.

Kelley, V. W.
1935. A summary of good orchard practices. Ill. Hort. Soc. Trans. 68: 314-326.
Clean-up practices urged.

Lamar, H. H.
1935. [Codling moth control.] Ill. Hort. Soc. Trans. 68: 489-491.
A grower had good success with sanitation, heavy spray schedule, and washing.

Lilly, J. H.
1935. Apple harvest precautions. Wis. Hort. 26: 5.
Packing sheds; adults very numerous in such places, should be dealt with. Traps at Sturgeon Bay, Wis., caught comparatively few moths; light infestation in 1935.

Lipman, J. G.
1935. Orchard insect investigations. N. J. Agr. Expt. Sta. Rept. 56: 41-42.
A neglected orchard studied. Oil and nicotine sprays compared with lead arsenate. Nicotine sulphate and tannate with bentonite and summer oils compared well with lead arsenate. Spray injury studied.

List, G. M.
1935. Codling moth control in Colorado. Ill. Hort. Soc. Trans. 68: 177-191.
In Colorado dry conditions and regular crops favor codling moth. It has increased steadily for 40 years until it is a limiting factor. Strain of codling moth in Grand Valley is more hardy and vigorous than in East. Infestation heavy in 1934.
Experiments noted in detail. Oil improved control when used with lead arsenate, as did spreader. Cryolite shows promise; Kutane gave poor results; omission of any sprays gave increased injury. Banding, packing-shed clean-up, and similar practices are urged. Notes on bait traps (useful), Trichogramma (not useful), washing, etc.

Lockwood, S.
1935. Three peach insects that need watching. Calif. Cult. 82: 669, 697.
Codling moth more abundant than usual (in California in 1935). A long season with moths numerous late in the summer led to unusual infestation of peaches in places. Habits compared with those of the oriental fruit moth and peach twig borer. (The latter is more common than codling moth on peach in California.) Clean-up measures urged.

Lockwood, S.
1935. Control of the codling moth. Blue Anchor 12 (4): 4-5, 23.
Notes on habits, orchard and packing-shed sanitation, sprays. Calyx and 3 cover sprays advised in Sacramento Valley. Bait pans for timing sprays, chemical bands, discussed.

Mackie, D. B.
1935. Entomological service. Bull. Calif. Dept. Agr. 24: 412.
Sterilization of boxes by means of vacuum fumigation with 40 pounds of carbon disulphide and carbon dioxide per 1,000 cubic feet, with temperature over 50° F. and exposure of 2 hours or more, is effective against hibernating larvae in boxes.

Mackie, D. B.
1935. Field entomology. Bull. Calif. Dept. Agr. 24: 422.
Abundant in pears in Sacramento Valley in 1934; spread to peaches, in one case 1 percent infestation in peaches.

Maheux, G.
1935. The codling moth in the province of Quebec. Rept. Pomol. and Fruit Growing Soc. Quebec 41: 71-73.
Worst fruit pest of Quebec. History, habits, and control outlined.

Marshall, G. E.
1935. Preventing spring emergence of codling moth from inaccessible places on trees. Jour. Econ. Ent. 28: 120-122.
Substances to kill larvae wintering on bark in inaccessible places. A number tested; alpha-naphthylamine in parawax, tallow, or crank-case oil, with hydrated lime, was effective. Cost, 12 cents a tree.

Marshall, G. E.
1935. Present status of chemically treated bands for use in codling moth control. Ind. Hort. Soc. Trans. 74: 41-44.
Bands tested. Alpha-naphthylamine gave good results when used with oil and "parawax", and was the best substance tried.

Marshall, G. E.
1935. 1934 Codling moth spray tests. Ind. Hort. Soc. Trans. 74: 62-65.
Some substitutes for lead arsenate showed promise, but none were equal to lead arsenate with summer oil and soap, 1934. Residue washing was necessary.

Marshall, G. E.
1935. 1934 spray tests. Hoosier Hort. 17: 21-24.
A number of sprays tested; much as abstracted elsewhere.

Marshall, G. E.
1935. Present status of chemically treated bands for use in codling moth control. Hoosier Hort. 17: 35-37.
Chemical bands a cheaper way than spraying to kill codling moth. Alphanaphthylamine with lubricating oil and parawax has led other materials in results.

Marshall, G. E.
1935. Electrocutor light trap tests with codling moths. Hoosier Hort. 17: 41-43.
Electrocuting light traps, a number tested. Moths not attracted far from orchard. Traps useful in packing shed. Best light tested was 15W. mercury vapor tube.

Marshall, G. E.
1935. Timing sprays by use of bait traps. Hoosier Hort. 17: 69-73.
Bait traps for timing sprays described; give picture of adult flight. Molasses with a little citronella, or brown sugar syrup with a little oil of sassafras and saponin, are good.

Marshall, G. E.
1935. The use of soaps, spreaders and stickers in codling moth sprays. Hoosier Hort. 17: 101-103.
Notes on soap spreader; has added to success with oil and lead arsenate. Water from different sources varied with respect to amount of soap needed.

Marshall, G. E., and Hienton, T. E.
1935. Light traps for codling moth control. Agr. Engin. 16 (9): 365-368, 371.
A number of lights tested, lights rotated. Mercury vapor tube, 15 watt, was in lead.

Marshall, J.
1935. The experimental application of calcium arsenate for codling moth control in an arid region. Jour. Econ. Ent. 28: 960-965.
Calcium arsenate used with success in Nova Scotia, with lime or ferric oxide. Most places report it unsatisfactory; less effective against codling moth, more injurious to tree.
Experiments in Washington State show that in a dry district, with buffer materials, calcium arsenate is safe on trees. Its effectiveness is not yet as high as desired, but it shows promise.

Marshall, J.
1935. Soap-lead arsenate and kerosene-soap lead arsenate mixtures in codling moth control. Northw. Fr. Grow. 7 (2): 4, 14.
Soap is helpful but may cause some tree injury in lead arsenate spray; ammonia or amine soaps better than alkali soaps. Kerosene used with soap increases deposit. Soap and kerosene at dilutions used are not in themselves insecticidal.

Marshall, J., Eide, P. M., and Priest, A. E.
1935. Increasing and maintaining lead arsenate deposits for codling moth control. Wash. State Hort. Assoc. Proc. 30: 52-64.
Oils and soaps may help in building up spray cover of lead arsenate. Comparison of different oils; fish-oil, oleic acid, and mineral oil.

Marshall, J., and Groves, K.
1935. The present status of calcium arsenate in codling moth control. Wash. Hort. Assoc. Proc. 31: 142-150.
Calcium arsenate given careful trial. Some spray formulas show promise; all must be used with buffer. Considerable detail given.
("Average deviation" used to measure significance. "Difference exceeding average deviation is probably due to actual difference in the material.")

McCown, M.
1935. Pruning as an aid in codling moth control. Ind. Hort. Soc. Trans. 74: 32-33.
Pruning properly is of help in spraying and banding.

McCown, M.
1935. [Pruning in control.] Hoosier Hort. 17: 24-25.
Pruning is an aid in effective spraying and banding.

McCown, M.
1935. Scab and codling moth yield to well planned programs. Hoosier Hort. 17: 147-148.
Program was successful in Indiana in 1935. Mostly on scab.

McGuire, D.
1935. [Codling moth control.] Ill. State Hort. Soc. Trans. 68: 485-487.
Describes control procedure (10 sprays lead arsenate) and necessary washing. Praises use of oil with lead arsenate. Of his apples, 72 percent were No. 1 grade.

McMullin, J.
1935. Results and recommendations in the practical use of natural cryolite. Northw. Fr. Grow. 7 (11-12): 4, 11.
Advocates use of cryolite in latter part of season, from control and residue standpoints.

McWhorter, O. T.
1935. Tree scraping for moth control. Better Fruit 29 (8): 14-15.
Tree scraping essential for successful banding. Methods and costs noted.

Newcomer, E. J.
1935. Orchard sanitation for the control of the codling moth. Wash. State Hort. Assoc. Proc. 31: 140-141.
Orchard sanitation; banding with chemical bands, cleaning up boxes, etc., recommended.

Newcomer, E. J.
1935. [Codling moth control.] Nebr. State Bd. Agr. Rept. 1935: 547-552.
Not seen. Chemical bands, treating boxes (bibliographer).

Newcomer, E. J.
1935. Codling moth -- a national problem. Better Fruit 29 (8): 8, 21.
Some recent problems and advances in control.

Newton, J. H.
1935. Codling moth studies, North Fork Valley of Colorado. Colo. Agr. Expt. Sta. Bull. 414. 47 pp.

In North Fork Valley (Paonia, etc.). Life history discussed in detail. A second generation 40 to 60 percent complete. Second-generation adults rare. Spring adults in May and June, first-generation adults in July and August. Outline of control program; 5-spray schedule. Trichogramma present, may parasitize 50 percent or more of eggs in September. Oil with lead arsenate improves control but should be used cautiously. Clean-up measures and bands are of value; bait and light traps help in timing spray. Substitutes for lead arsenate are unsatisfactory.

Newton, J. H.
1935. Codling-moth control experiments of 1934. Colo. State Ent. Cir. 65. 23 pp.

Activity and infestation high in 1934. Season early and long. A bulletin full of detailed reports of biology and control.

Population in 1934 was three times as great as in 1933, one and one-half times as great as in 1932, and twice as great as in 1931.

Control experiments and results. Lead arsenate good; oil improved it but nicotine did not. Film coverage is better than spot coverage and easier to wash off. Calcium caseinate is helpful. Cryolite is promising but hard to remove with acid wash. Costs given.

Niven, L. A.
1935. Lessons from Arkansas station. Prog. Farm. (Miss. Val. ed.) 50 (12): 19, 41.

Quotes Isely as saying lead arsenate must be main dependence in control; bands may help in bad infestation.

Overley, F. L., Overholser, E. L., St. John, J. L., and Groves, K.
1935. Further experiments in spray-residue removal. Proc. Wash. State Hort. Assoc. 30: 77-82.

Residue removal. Sprays of lead arsenate with soap or oil controlled codling moth, but left residue too great for ordinary washing. Tandem wash of hydrochloric acid and sodium silicate needed, with addition of oil.

Parks, T. H.
1935. Present status of codling moth control in Ohio. Jour. Econ. Ent. 28: 612-613.

Three cover sprays are sufficient except in Ottawa and Lawrence Counties where more control is needed. The codling moth has increased but is not out of hand.

Parks, T. H.
1935. The status of codling moth control in view of recent developments and restrictions. Midwest Fruitm. 8 (10): 3, 9.

Review of control situation in general and in Ohio; much as abstracted elsewhere.

Parks, T. H.
1935. The status of codling moth control in view of recent developments and restrictions. Ohio State Hort. Soc. Proc. 68: 41-46.
Recent developments; favorable weather, rapid moth increase, residue restriction. Orchards may be divided into heavily and lightly infested. In latter, four sprays will do, and calcium arsenate or oil-nicotine may be substituted for lead arsenate in last spray. In bad orchards, six or eight sprays, using lead arsenate, or lead arsenate with oil, later washing; also clean-up and banding.

Parrott, P. J.
1935. Spray problems: in retrospect and prospect. N. Y. State Hort. Soc. Proc. 80: 25-33.
No material change. Hudson and Champlain areas enjoying light infestation and curtailed spray program; no residue cleaning necessary. Reverse is true in western New York. Lead arsenate and lime is best, heavy dosage, six cover sprays. Lead arsenate and oil may be used early in season. Nicotine may be of value in early varieties.

Parrott, P. J., and Collins, D. L.
1935. Some further observations on the influence of artificial light upon codling moth infestations. Jour. Econ. Ent. 28: 99-103.
Influence of light traps. Electrocuting light traps decreased the percentage of injured apples markedly, but did not give complete control and were too expensive for practical use.

Persing, C. O.
1935. A discussion of various oils in spray combinations with lead arsenate, cryolite and barium fluosilicate. Jour. Econ. Ent. 28: 933-940.
Study of oil with stomach poisons. Codling moth is one of insects studied. Oils added to deposit of lead arsenate or fluorides and gave more mortality. Oleic acid was better than mineral oil with lead arsenate.

Petch, C. E.
1935. Discussion. Pomol. and Fruit Growing Soc. Quebec Rept. 41: 50.
Control. Calcium arsenate is all right in light infestation; lead arsenate is best. With six sprays injury was 1.86 percent. Sanitation should be practiced.

Pickett, A. D.
1935. Insect outlook for 1936. Nova Scotia Fruit Growers' Assoc. Rept. 72: 71-72.
Codling moth increased in 1935. Sprays: Calyx, post-calyx, and July.

Porter, B. A.
1935. Lead arsenate substitutes still sought for the control of fruit insects. U. S. Dept. Agr. Yearbook 1935: 244-246.
Search for substitutes for lead arsenate. Other arsenicals, fluorine compounds, nicotine combinations, derris, and pyrethrum, tried. All show some good features but none are fully satisfactory.

Porter, B. A.
1935. Recent developments in codling moth control. Pa. State Hort. Assoc. News 12 (1): 51-58.
Recent control developments outlined. Lead arsenate substitutes so far not entirely satisfactory. Use of lead arsenate with later washing is present practice. Traps are still experimental. Clean-up and bands have value.

Porter, B. A.
1935. This codling moth battle. Mountaineer Grower 6 (59): 5-9.
Problem of high population and residue restrictions outlined. Shenandoah area is intermediate between heavily infested Western and lightly infested Northeastern States.
Nicotine is best approach to the desired substitute for lead arsenate, so far. Fluorides, derris, pyrethrum, and calcium arsenate are not fully satisfactory. Light traps for adults reduce population but are expensive. Trichogramma ineffective.

Richardson, C. H.
1935. Bionomics and control of the codling moth and apple maggot. Iowa Agr. Expt. Sta. Rept. 1935: 112-113.
1934 was hot and dry and apple crop was small. Oil-nicotine in late sprays proved good. Bait traps gave seasonal-history records. "June drop" apples have very few larvae. Bands on both trunk and limbs are needed. Trees are more heavily infested in upper part, small crops are more heavily infested than large ones; 300 apples from a tree give a good picture of codling moth infestation. Infestation may increase markedly in last few weeks.

Roark, R. C.
1935. Research to find substitutes for lead arsenate. Conn. Pomol. Soc. Proc. 45: 159-165.
Substitutes for lead arsenate; the field reviewed. Organic compounds most promising.

Roberts, B. T.
1935. Our experiences in control of codling moth and our methods in the harvesting and packing of fruit. Md. State Hort. Soc. Proc. 37: 45-47.
Control and handling methods. Attributes much of his own trouble to trees being larger and harder to treat than a few years ago. Plans to do more thorough spraying.

Robertson, W. H.
1935. Report of provincial horticulturist. Brit. Colum. Dept. Agr. Rept. 29: R-29-R-30.
Codling moth was in all important orchard districts of British Columbia in 1934. It is rated as the worst orchard pest. Control by timely spraying is feasible.

Ryan, H. J.
1935. Annual report of the agricultural commissioner, County of Los Angeles. Calif. Agr. Monthly Bull. 24: 278.
Codling moth on walnut in California. Earlier than usual in 1934, with heavier infestation.

Scarff, H. N.
1935. Growers' experiences with codling moth control. Ohio State Hort. Soc. Proc. 68: 31-33.
Control not very satisfactory. Spray schedule discussed, with weak and strong points. Calyx spray is very essential. First cover spray should have been earlier.

Schoene, W. J.
1935. Codling moth clean-up. Virginia Fruit 23 (12): 12-13.
Clean-up in winter urged, both in orchard and packing shed.

Schoene, W. J., and Jefferson, R. N.
1935. Tests of contact insecticides on the eggs of the peach moth and the codling moth. Jour. Econ. Ent. 28: 182-184.
Ovicides; orthol K., with or without nicotine, was effective; nicotine and soap sprays less effective.

Schowengerdt, G. C., West, D. C., and Murneek, A. E.
1935. Causes of cull apples. Mo. Agr. Expt. Sta. Bull. 343: 18.
Codling moth one of chief causes of cull apples in Missouri in 1928 and 1929. Late brood caused injury; some stopped spraying too soon. In southwestern part of Missouri neglected orchards caused spread to commercial orchards.

Sherman, F. III
1935. Drained crank-case oil for codling moth bands. Jour. Econ. Ent. 28: 31.
Bands with oil; used drained crank-case oil with good results.

Sherman, F. III
1935. Preparation and use of chemically treated codling moth bands. Midwest Fruitm. 8 (10): 7.
Instructions for banding.

Siegler, E.H., and Munger, F.
1935. A laboratory spray apparatus. Jour. Econ. Ent. 28: 704-706.
Laboratory sprayer described; for uniform application in toxicity studies.

Skinner, J. H.
1935. Department of Entomology. Ind. Agr. Expt. Sta. Rept. 48: 33-37.
Substitutes for lead arsenate are unsatisfactory; washing off residues is necessary. Timing sprays better, use of screens and trap lights in packing houses, and chemical bands, have been found good. Cavity fillers and debris burning seem promising. Light traps are being studied.

Smith, L. E., Munger, F., and Siegler, E. H.
1935. Phenothiazine, a promising new insecticide. Jour. Econ. Ent. 28: 727-728.
Phenothiazine is as toxic as lead arsenate to codling moth in laboratory.

Smith, R. H.
1935. Possibilities of controlling codling moth with nicotine vapor. Proc. Wash. State Hort. Assoc. 30: 72-75.
On nicotine vapor against adults; vaporized in tree.

Smith, R. H., and Persing, C. O.
1935. Further report on nicotine vapor in codling moth control. Jour. Econ. Ent. 28: 971-975.
Nicotine vapor as a tree fumigant; can kill adults by 15 to 30 cc. of 50 percent nicotine per tree in open air on calm day. It is possible that control by spraying might be simplified by a few nicotine treatments costing about 6 cents per tree.

Smith, R. H., and Persing, C. O.
1935. Codling moth control by killing the moth. Better Fruit 29 (9): 5.
Notes on killing adults. Traps have not been successful. Experiments with use of nicotine vapor under curtains described. It is very toxic to moths.

Smith, R. H., and Persing, C. O.
1935. Further report on nicotine vapor for codling moth. Northw. Fr. Grow. 7 (7): 4.
Notes on tree fumigation or sprays against adults; as noted elsewhere.

Stearns, L. A.
1935. Comments concerning codling moth control in Delaware. Jour. Econ. Ent. 28: 176-182.
In Delaware; spring emergence and development, and spray program, summarized for years 1930-1934. Lead arsenate with subsequent washing recommended.

Stearns, L. A., MacCreary, D., and Haden, W. R.
1935. Bionomics and control of the codling moth (Carpocapsa pomonella L.) Del. Agr. Expt. Sta. Bull. 192: 32.
In Delaware; control problem receiving study. So far use of lead arsenate and subsequent washing seems best. Population was lower and development later in 1934 than in several years previous.

Stearns, L. A., Rice, P. L., and Guy, H. G.
1935. Results of experimental spraying, during 1935, for control of the codling moth. Peninsula Hort. Soc. Trans. 49: 95-102.
Spraying experiments. Codling moth less abundant in 1935 than in 1934. Cool, wet weather retarded it. Seasonal history outlined. First adults May 5, first larvae May 30, first summer adults July 8. Control was effective. Spray results and recommendations. Lead arsenate most satisfactory poison. Oil in earlier sprays is helpful.

Steiner, L. F.
1935. An improved codling moth trap. Jour. Econ. Ent. 28: 1075-1076.
Development of bait trap described; two wide-mouth jars with 1/3-inch screen covers.

Steiner, L. F.
1935. The codling moth and its control under Tennessee conditions. Proc. Tenn. Hort. Soc., 29th and 30th Conventions: 44-53.
Tennessee status. A vexing problem; becoming more difficult to control. Life cycle outlined. Thorough sprays properly timed, clean-up, and banding urged.

Steiner, L. F., Ackerman, A. J., and Hamilton, D. W.
1935. The value of supplementary measures in the codling moth control program. Ind. Hort. Soc. Trans. 74: 34-41.
Supplementary controls discussed. Clean-up reduced injury about 40 percent. Banding is valuable. Bait traps are useful in timing sprays; light traps show promise but are too expensive.

Steiner, L. F., Ackerman, A. J., and Hamilton, D. W.
1935. The value of supplementary measures in the codling moth control program. Hoosier Hort. 17: 52-58.
Bands, baits, and lights discussed, much as noted elsewhere. Clean-up and chemical bands reduce population. Bait traps help in timing sprays.

Steiner, L. F., Sazama, R. F., and Fahey, J. E.
1935. Insecticide tests to control the codling moth at the Vincennes, Indiana, laboratory during 1934. Ind. Hort. Soc. Trans. 74: 66-71.
Spraying alone is inadequate with heavy infestation. Detailed reports of tests. Ten sprays failed to control, and residue could not be washed off satisfactorily. Oil-nicotine showed promise for late summer as compared with lead arsenate. Cryolite and copper cyanide were effective but hurt tree or fruit. Better and more frequent early sprays should have been used.

Strong, L. A.
1935. Early clean-up catches moth. Northw. Fr. Grow. 7 (2): 5.
Urges early season attention to orchard and shed sanitation.

Swenk, M. H.
1935. How the 1934 drouth affected the codling moth life cycle. Nebr. Bd. Agr. R. for 1935: 555-563.
Mild dry winter unfavorable, dry warm spring hastened development. High midsummer temperatures killed some moths.
At Lincoln, first emergence of generations, May 9, June 12, July 21, respectively. Many data on broods.

Symons, T. B.
1935. Entomology. Md. Ext. Rept. 1934: 62.
Situation somewhat better than in the last two years, due to better control.

Symons, T. B.
1935. The passing of a decade. Univ. Md. Ext. Serv. Summ. Ext. Activ. 1924-1934. 73 pp.
Infestation reduced from 18.14 percent in 1930 to 6.2 percent in 1934 by better methods. Residue problem can be solved.

Torpen, E.
1935. Banding apple trees. Pac. Rur. Press 130: 473.
Notes on methods and results with chemical bands. They are advised for heavy infestations.

Troth, M. S.
1935. What is the most practical control for the codling moth? Ill. Hort. Soc. Trans. 68: 473-485.
An Indiana grower outlines conditions which will affect codling moth in next crop; present population, weather, clean-up work, next year's spraying. Lead arsenate and summer oil best; nicotine may be used on summer apples after first cover spray. Points in good clean-up discussed.

Troth, M. S.
1935. More codling moth notes. Hoosier Hort. 16: 163-165.
Various notes on control experiments in progress.

Troth, M. S., and Marshall, G. E.
1935. The cost of controlling apple insects and diseases, with special reference to the codling moth. Jour. Econ. Ent. 28: 698-701.
Cost of control. Cost of production estimated at 78 cents per bushel in Indiana; with 40 cents of this chargeable to pest control, of which 33 cents is for codling moth.

Troth, M. S., and Marshall, G. E.
1935. The cost of controlling apple insects and diseases, with special reference to the codling moth. Hoosier Hort. 17: 183-185.
Cost of control; as abstracted elsewhere.

Trumble, R. E.
1935. Kryocide. Northw. Fr. Grow. 7 (9): 5, 15.
Believes natural cryolite sprays late in season to be of great value.

Van Leeuwen, E. R.
1935. Investigations of baits attractive to the codling moth. Wash. Hort. Assoc. Proc. 31: 136-139.
Baits investigated; 250 materials tested. They help to show development in the field, thus timing sprays; also may actually reduce moth population.

Wakeland, C.
1935. Some factors influencing codling moth control. Better Fruit 29 (8): 10-11, 20.
Factors reducing overwintering codling moth; Clean-up of apples, boxes, orchard; natural mortality.
Factors favoring first brood: high winter survival, early spring, warm nights for oviposition, large areas in orchard, bad weather for spraying. Factors reducing first brood: Destruction of wormy apples, chemical bands, enemies, spraying.
Factors favoring large later broods: High first-brood survival, long warm season, extensive orchard areas, poor spraying. Difficulties are caused by careless neighboring growers.

Every condition favored codling moth in 1933 in Idaho. When conditions are so favorable, a grower must kill 99 percent of each generation to get a 95 percent clean crop. A 95 percent kill is not nearly enough. Thorough and timely sprays, especially calyx and first cover, urged.

Webster, R. L.
1935. The codling moth and the weather. Jour. Econ. Ent. 28: 956-960.
Weather relations. Important factors: Initial infestation, May temperatures (warmth favors oviposition), August temperatures (warmth lengthens season), winter temperatures (affect survival). Early first-generation adults and stragglers between broods may be important. Four years out of nine since 1925 bad (1929, 1931, 1932, 1934) in Washington.

Webster, R. L.
1935. Codling moth control in Washington. Better Fruit. 29 (8): 3-4, 22.
Cool nights in May and cool Augusts are unfavorable to codling moth. Mild winters are favorable. All factors tended to make 1934 a bad year in Washington. Work is going forward to find substances which aid in building up lead arsenate cover; neutral soap is promising.

Webster, R. L.
1935. Weather and moths. Northw. Fr. Grow. 7 (1): 9.
Notes on weather effects, as abstracted elsewhere.

Webster, R. L., and Marshall, J.
1935. Non-arsenicals and non-lead arsenicals for codling moth control, Wash. Bul. 325 (Expt. Sta. Rept. 45): 36.
Nicotine-oil gave some control. Calcium arsenate and zinc arsenite gave good results.

Wicks, W. H.
1935. Report for Idaho. Calif. Dept. Agr. Spec. Pub. 137: 29.
Control in Idaho; a bad problem. Losses, 1931, 12.4 percent; 1932, 16.4 percent; 1933, 28.1 percent; 1934, 16.0 percent. Better spray timing and removal of worthless trees sought.

Wolff, K. L.
1935. Plant pest control. Los Angeles County, Calif., Rept. Agr. Comm. 1935: 8-23.
In Los Angeles County, Calif., 1934-35, only 4,805 acres of pears and apples sprayed as against 7,000 in 1933-34. Late worms were a problem on pears. Two to five sprays used. On walnuts control was satisfactory. Notes on compulsory control.

Woodside, A. M.
1935. Chemically treated codling moth bands. Va. Fruit 23 (4): 23-24.
Chemical bands are valuable in Virginia. Thoroughness in work urged, procedure described.

Worthley, H. N.
1935. Watchman, what of the codling moth? Rural New Yorker 94 (5319): 167, 171, 181.
Popular discussion; seriousness; modern crop conditions favor codling moth; worny fruit now unsalable. Recent spraying problems. Use of chemical bands, light traps, and arsenical substitutes.

Worthley, H. N.
1935. Codling moth. Pa. Agr. Expt. Sta. Bull. 320: 29. (48th Annual Report.)
Lead arsenate and fish oil gave control with heavy residue; 2 covers of lead arsenate with later sprays of oil-nicotine gave control and moderate residue. Fixed nicotine is promising. Notes on bands, baits, lights.

Worthley, H. N., and Marston, L. C.
1935. Codling moth research in 1934. Pa. State Hort. Assoc. News 12 (1): 96-107.
Research in 1934 in Pennsylvania discussed; mostly on spraying. Fish oil adds to effectiveness of lead arsenate. Chemical bands were useful. Codling moth seems likely to be less numerous in 1935 than in 1934.

Yocum, W. W.
1935. [Codling moth control.] Nebr. State Bd. Agr. Rept. 1935: 552-555.
Control tests, 1934, unsatisfactory because of drought. Nicotine-oil nearly equaled lead arsenate.

Yothers, M. A., Allen, P. B., and Scheffer, P. M.
1935. High percentage of parasitization of codling moth eggs by Trichogramma minutum in the Wenatchee, Wash., district. Jour. Econ. Ent. 28: 247-248.
Trichogramma parasitized over 80 percent of Carpocapsa eggs in some orchards late in summer in Washington; 20 percent at end of June. Parasitization highest in neglected orchards.

Anonymous
1935. Pruning aids codling moth control. Amer. Fruit Grower 55 (4): 26.

Anonymous
1935. Recommendations for codling moth control in Washington, for 1935. Better Fruit 29 (9): 3-4.
In Washington, 1935; recommendations, much as abstracted from a State publication.

Anonymous
1935. Scientists hunt high and low for new ways to kill apple worms. Citrus Indus. 16 (3): 24.
Notes on search for better control methods in the United States, very general.

Anonymous
1935. Annual field day at Bedford. Hoosier Hort. 17: 110-111.
Alpha-naphthylamine and old crank-case oil, 1 to 3, good for putting in tree holes to destroy wintering larvae.

Anonymous
1935. Codling moth survey in western Maryland for 1934. Md. Hort. Soc. Proc. 37: 36.
Table shows details, 18 orchards; fruit free from insect injury was from 59.3 to 95.3 percent, average 78.2 percent. Nearly all insect injury was from codling moth.

Anonymous
1935. Codling moth survey on Eastern Shore for 1934. Md. Hort. Soc. Proc. 37: 37.
Table of seven orchards; fruit free from insect injury 43.1 to 95.6 percent, average 73.2 percent. Most insect injury was from codling moth.

Anonymous
1935. Biology. New Mex. Agr. Expt. Sta. Rept. 45: 36-42.
Mercury light more attractive to adults than ordinary electric bulb. Cane-sirup bait increases attractiveness of light.

Anonymous
1935. Department of Entomology. Purdue Univ. Agr. Expt. Sta. Rept. 47: 33-37.
Lead arsenate with oil is the leading insecticide. Sanitation and banding are useful.

Anonymous
1935. Recommendations for codling moth control in Washington for 1935. Wash. Ext. Bull. 201, 7 pp.

Federal workers and State research, extension, college, and State Department of Agriculture workers cooperate on control. Winter clean-up of sheds, banding, thinning out wormy fruit, timing sprays properly and applying them thoroughly. Lead arsenate should be used and residue washed off. Oil may be used in a few early sprays with lead arsenate; nicotine-oil is also good early in summer. Fluorides should not be used.

Anonymous
1935. Spray committee bulletins. Northw. Fr. Grow. 7 (7): 10.
Notes on seasonal progress; second-brood sprays urged.

Anonymous
1935. Codling moth control program outlined for 1935. Wash. Farm. 60 i.e. 70: 95, 112.
Standardized uniform recommendations of State and Federal authorities in Washington State.

Anonymous
1935. Prunings from the field. Blue Anchor 12 (9): 15.
Notes on weather and brood activities; abstracted from entomological publications.

Anonymous
1935. Scientists hunt new ways to kill codling moth. Midwest Fruitm. 8 (9): 5.
Review of search for new methods; nicotine promising.

Anonymous
1935. Early clean-up to catch early codling moth worm. Midwest Fruitm. 8 (9): 7.
Notes on sanitation.

Anonymous
1935. Recommendations for codling moth control in Washington for 1935. Northw. Fruit Grower 7 (3): 4, 5.
Standardized recommendations; as abstracted elsewhere.

Anonymous
1935. [Notes on supplemental codling moth control methods.] Northw. Fruit Grow. 7 (5): 4.
Brief notes from scientific reports.

Anonymous
1935. Northcentral Washington spray bulletins. Northw. Fr. Grow. 7 (6): 6.
Notes on progress of insect and orchard work; use of mineral oil (3/4%) as ovicide is urged.

FOREIGN REFERENCES

Australia

Allman, S. L.
1935. The codling moth problem. Results of trials at Bathurst. Agr. Gaz. N. S. Wales 46: 459-463. (Rev. Appl. Ent. 23: 720.)
Control tests. Lead arsenate was best; oil increased its effectiveness. Bands were helpful. Residue problem noted.

Fowler, R.
1935. Codlin moth experiments, Blackwood, 1934-1935. Jour. Dept. Agr. So. Aust. 39 (4): 458-467. (Rev. Appl. Ent. 24: 210.)
Experiments on control, detailed plat studies, bait traps, bands. Five sprays put on; oil substituted for lead arsenate in last three with good results. Two broods; adults November and February.

Jarvis, H.
1935. Codlin moth control by non-arsenical sprays. Queensland Agr. Jour. 43 (1): 5-8. (Also Queensland Ent. Pamphlet 21.) (Rev. Appl. Ent. 23: 267.)
Tests of substitutes for lead arsenate. Nicotine-oil gave better results than lead arsenate, others poorer.

Newman, L. J.
1935. Descriptive account of the codlin moth, together with notes on its control. Jour. Dept. Agr. West. Aust. (2) 12: 264-277. (Rev. Appl. Ent. 24: 133.)
A pest over Australia, except Western Australia, where it is not found. Outline of habits and control.

Wickens, G. W.
1935. Codlin moth. Jour. Dept. Agr. West. Aust. (2) 12 (1): 89. (Rev. Appl. Ent. 23: 396.)
An infestation discovered in Western Australia; 10 acres. Efforts made to clean it up.

Anonymous.
1935. Insect pests and their control. Agr. Gaz. N. S. Wales 46: 19-23, 105-109, 441-445. (Rev. Appl. Ent. 23.)
Notes on biology and control in New South Wales.

Anonymous
1935. Quarantine Proclamations 10F and 11P. Commonwealth Aust. Gaz. 49. (Rev. Appl. Ent. 24: 119.)
Regulations to prevent introduction into Western Australia from other parts of Australia.

England

Adkin, R.
1935. Laspeyresia (Carpocapsa) pomonella, L.; some notes on its life-history in Britain. Entomologist 68: 25-26. (Rev. Appl. Ent. 23: 189.)
Spring adults late in June and July. A partial second generation, depending on July temperature. Some larvae may hold over two winters.

Greenslade, R. M., Massee, A. M., and Thomas, F. J. D.
1935. Apple blossom weevil experiments in 1934. Impregnation of tree-banding materials. Rept. E. Malling Research Sta. (1934) 22: 180-184. (Rev. Appl. Ent. 23: 427.)
Chlorinated naphthalenes in bands seemed to attract codling moth larvae, and did not injure them.

Kearns, H. G. H.
1935. Insect pests of gardens in the Bristol district and how to control them. Proc. Bristol Nat. Soc. 7: 542-548. (Rev. Appl. Ent. 23: 685.)
Control; lead arsenate or derris with sulphur, barium fluosilicate, and soap.

Massee, A. M.
1935. Notes on mite and insect pests for the year 1934. Rept. E. Malling Research Sta. (1934) 22; 165-172. (Rev. Appl. Ent. 23: 426.)
Codling moth occurred on apples in Kent in 1934.

Staniland, L. N., and Beaumont, A.
1935. Eleventh annual report of the department of plant pathology for the year ending September 30th, 1934. Pamphlet Scale-Hayne Agr. Col. No. 44, 59 pp. (Rev. Appl. Ent. 23: 621.)
Codling moth appeared to be on increase in Devon and Cornwall in 1934.

Warburton, C.
1935. Annual report for 1934 of the zoologist. Jour. Roy. Agr. Soc. England 95: 532-537. (Rev. Appl. Ent. 23: 255.)
Second brood injurious.

Annonymous
1935. [Fruit tree pest orders of 1935.] Statutory Rules and Orders, Gt. Britain 1935, No. 61 (Kent); Statutory Rules and Orders, Gt. Britain, 1935, No. 183 (Berkshire). London. (Rev. Appl. Ent. 23: 219.)
Authorizes compulsory control for these counties at discretion of local authorities.

Finland

Linnaniemi, W. M.
1935. [Report on Finland plant pests 1917-1923.] Valtion Maatalouskoetiminta Julkaisuja 68. (Rev. Appl. Ent. 23: 516.)
Codling moth occurs among fruit pests of Finland.

France

Balachowsky, A., and Viennot-Bourgin, G.
1935. Note sur le cycle evolutif du carpocapse dans la region parisienne. Compt. Rend. Acad. Agr. France 21: 1018-1024. (Rev. Appl. Ent. 24: 84.)
Loss in France 200,000,000 francs a year. Near Paris, one full generation and a very small second generation in 1934 and 1935. Adults from May to August, mostly late in May and in June.

Bruneteau, J.
1935. Considerations sur les traitements des arbres fruitiers. Rev. Zool. Agr. et Appl. 34: 1-12, 21-31. (Rev. Appl. Ent. 23: 302.)
Codling moth among pests of southwestern France. Control outlined.

Joessel, P. H.
1935. Remarques sur la biologie du carpocapse. Bull. Off. Agr. Midi 53, pp. 23-32. (Rev. Appl. Ent. 23: 521.)
Codling moth numerous around Avignon. Author claims to have found larvae mining in bark. First larvae in apples about end of May, nearly two months after bloom. Recommends sprays of fluorides or nicotine tannate. Regulations against arsenicals need revision.

Joessel, P. H., and Suav, J.
1935. Essais de traitements contre le carpocapse en 1934. Bull. Off. Agr. Midi 55: 260-308. (Rev. Appl. Ent. 23: 716.)
Control experiments at Avignon on pear. Arsenicals in a 3-spray schedule gave good control, lead arsenate (diplumbic) best. Results were much poorer when calyx spray was omitted.

Marchal, P., and Regnier, R.
1935. Des conditions d'efficacite des traitements contre le carpocapse. Compt. Rend. Acad. Agr. France 21: 1100-1107. (Rev. Appl. Ent. 24: 85.)
In Normandy, adults in June-July; very small second generation in August. Sprays: Pre-blossom, petal-fall, one later (about first of June); should be later spraying. Spraying continued till early in July gave good results.

Marchal, P., and Regnier, R.
1935. Nouvelles experiences sur le traitement des poiriers et pommiers contre la tavelure et la carpocapse. Compt. Rend. Acad. Agr. France 21: 1108-1111. (Rev. Appl. Ent. 24: 85.)
At Lyons, April and May sprays controlled first generation, but the second generation is injurious.

Germany

Maercks, H.
1935. Ueber die Wirkung von Nikotin und Pyrethrum auf die Eier des Apfelwicklers (Carpocapsa pomonella L.) und des bekreuzten Traubenwicklers (Polychrosis botrana Schiff.) Anz. Schadlingskunde 11 (2): 13-19. (Rev. Appl. Ent. 23: 336.)
Nicotine and pyrethrum sprayed on eggs did not hurt embryo, but killed larvae as they hatched (if not washed off in meantime).

Hungary

Fari, L.
1935. Beiträge zur Lebensweise und Bekämpfung der Apfelwickler (Carpocapsa pomonella L.) in Ungarn. Boraszati Lapok 16. 32 pp. (Rev. Appl. Ent. 23: 632.)
Severe injury in lower localities. In 1934, a partial third generation (unusual). Control suggestions.

India

Pruthi, H. S.
1935. The codling moth in India. Agr. and Livestock in India. 5: 522-523. (Rev. Appl. Ent. 24: 72.)
Not previously noted in India (except doubtfully from Kashmir). Authentic record made on apple in Baluchistan, at Quetta, 1935.

Italy

Jannone Lodispoto, G.
1935. [Some critical notes on present biological knowledge of C. pomonella.] Ortofrutticoltura Ital. 4, 5. (Rev. Appl. Ent. 23: 522.)
Reviews Italian literature on codling moth. Doubts Joessel's statement that larvae may mine wood.

Malenotti, E.
1935. [Third contribution on work against apple pests.] Italia Agr. 72: 217-237. (Rev. Appl. Ent. 23: 302.)
In 1934 a partial third generation; six sprays gave better results than four, and heavy dosage of lead arsenate was better.

Melis, A.
1935. [Use of breeding cages and bait trap pans to determine best date for arsenical spray against C. pomonella.] Note di Frutticoltura 1935, Nos. 4-6. (Rev. Appl. Ent. 23: 119.)
Advises use of breeding cages and bait pans to time spray applications.

Russia

Kolokhova, V. A.
1935. [Poisoned bands in control of codling moth.] Plant Protection 1935, fasc. 3, p. 117. (Leningrad.) (Rev. Appl. Ent. 23: 617.)
In central Russia chemical bands were effective, but lost their oil in one or two months.

Kovaleva, M. F.
1935. [Chemical control of codling moth.] Plant Protection 1935, fasc. 3, p. 118. (Leningrad.) (Rev. Appl. Ent. 23: 618.)
Only first generation was important in Voronezh in 1932. Some control notes.

Rekk, G. F., Vashadze, V. N., and Makharashvili, P. D.
1935. [Testing mineral-oil emulsions against orchard pests, report 1932-1933.] Trud. zonal'naia stantsiia plodovogo Khoziaistva 2, Tiflis. (Rev. Appl. Ent. 23: 674.)
Eggs succumbed to oil sprays in Georgia (Russia), 1932 and 1933.

Spain

Garcia, C. C., and Moreno, A. A.
1935. El "gusano" de las manzanas y peras. Serv. Agr. Nac. (Spain); Estac. Patol. Veg. Levante (Valencia).

General account of biology, injury, control; little of local Spanish interest. Usually two generations. Advises lead arsenate spray; calyx and two first-brood covers. Where pest is numerous, two second-brood cover sprays advised in July. Chemical bands advocated. Treat tender trunks with lime-sulphur or iron sulphate-lime solution after scraping.

Switzerland

Bovey, P.
1935. Observations sur le cycle evolutif de Laspeyresis (Carpocapsa) pomonella L. en Suise romande. La Murithienne Bulletin 53: 45-65. (Rev. Appl. Ent. 23: 593.)

Notes on weather and adult activities. Two arsenical sprays are insufficient when conditions are favorable. A second generation may develop. The species was injurious in 1933 and 1934.

Faes, H.
1935. Station federale d'essais viticoles a Lausanne et Domaine de Pully. Rapport annuel 1934. Landwirtschaftliches Jahrbuch der Schweiz 49: 619-664. (Rev. Appl. Ent. 23: 735.)

Codling moth quite injurious in warm season; second generation occurred. Control unusually difficult. Chemical bands were useful.

Wiesmann, R.
1935. Untersuchungen über den weiblichen Genitalapparat, das Ei und die Embryonalentwicklung des Apfelwicklers Carpocapsa (Cydia) pomonella L. Mitt. schweiz Ent. Gesell. 16: 370-377. (Rev. Appl. Ent. 23: 215.)

On female genitalia, egg, and embryonic development.